

adsorption rate which is an amount of oxygen adsorbed on a surface of the second region of the 2D material layer.

17. The semiconductor device of claim **16**, wherein the first oxygen adsorption rate is 0% and the second oxygen adsorption rate is 2% or more.

18. The semiconductor device of claim **17**, wherein the second oxygen adsorption rate is in a range of 2% to 30%.

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